



Armed Forces College of Medicine AFCM



Structure of Antibodies

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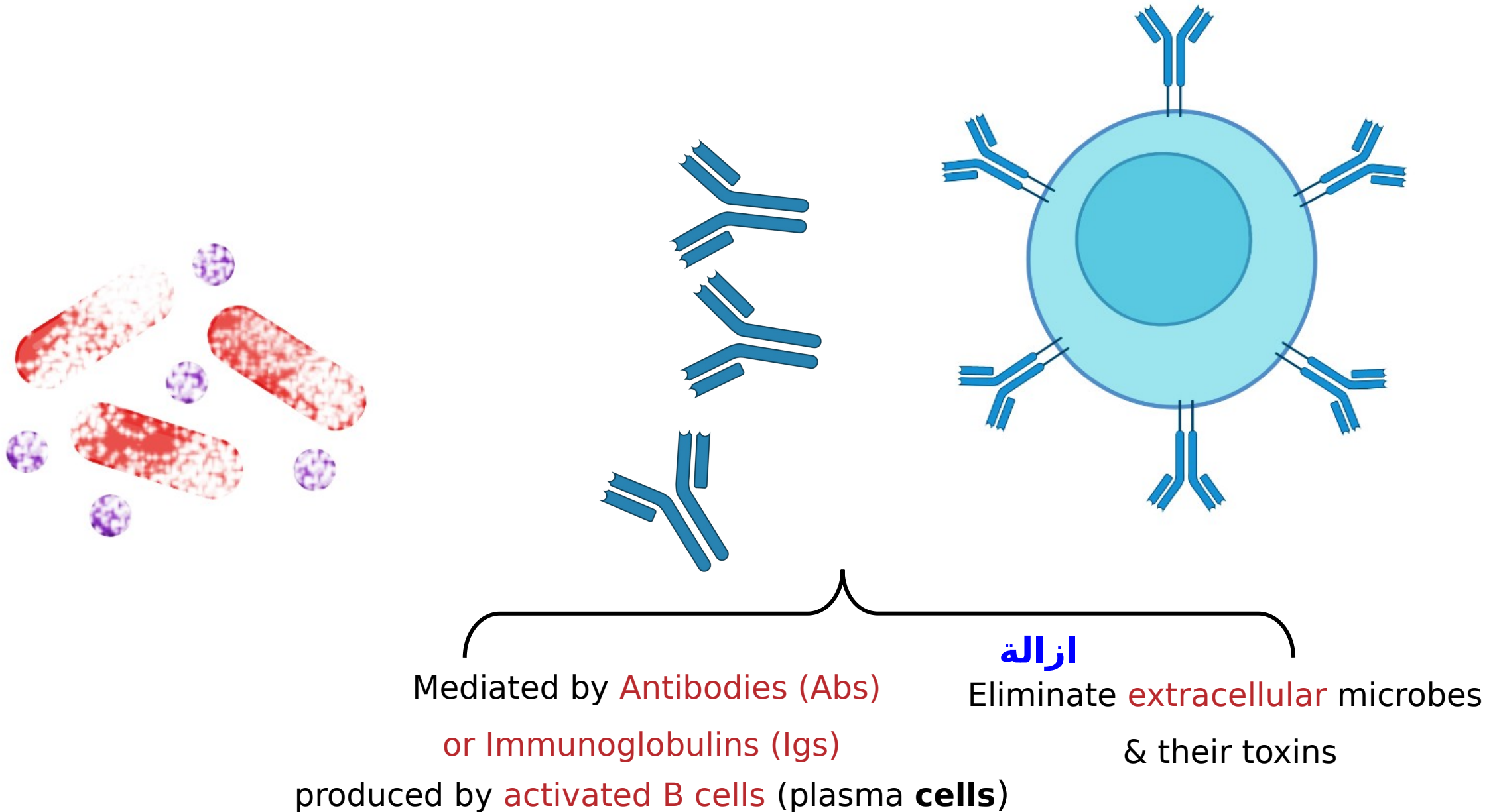
Humoral immune response



By the end of this lecture the student will be able to:

- 1-Outline series of reactions and functions of humoral immunity
- 2-Relate each part of immunoglobulin (antibody) molecule to its function
- 3-Discuss steps of development of B lymphocytes in bone marrow.

Humoral Immune Response



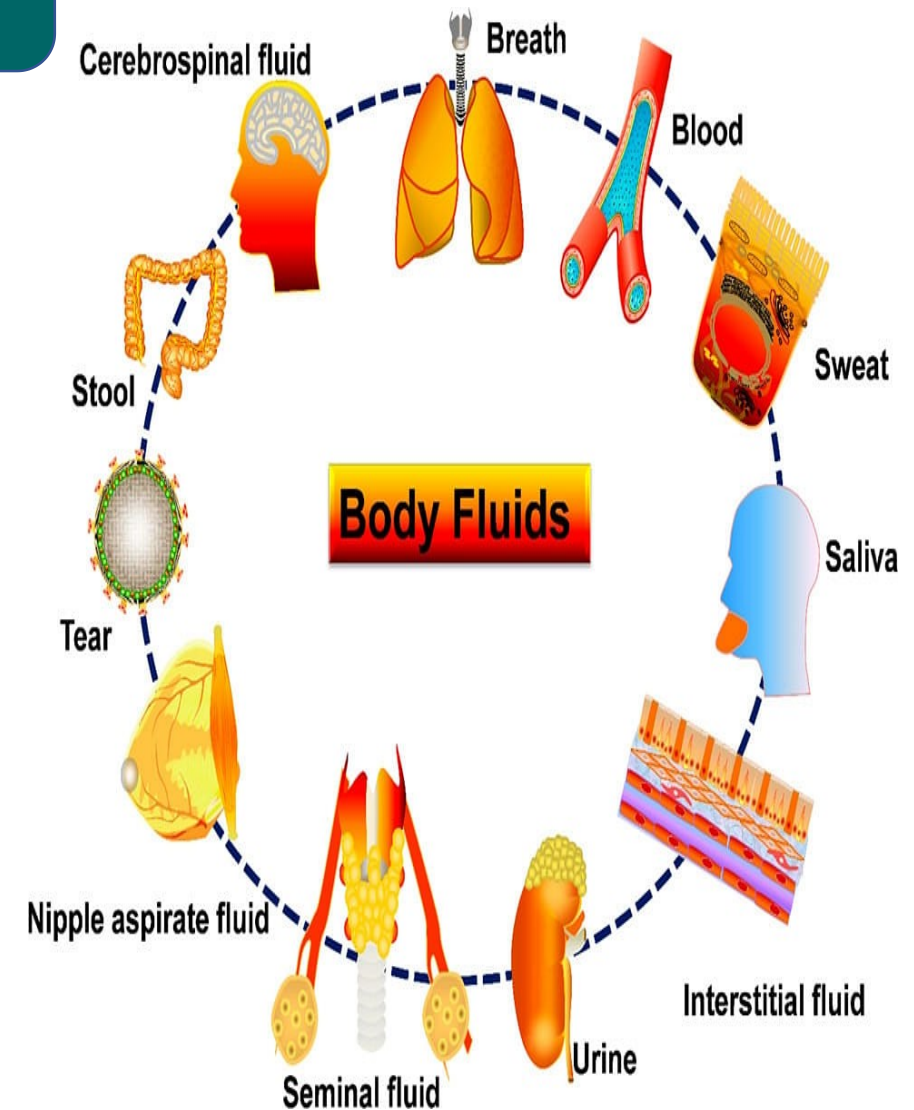
Immunoglobulins (Antibodies)

الاجسام المضادة

Humoral Immunity

Site

- Found in **all body fluids** (humors)



Immunoglobulins (Igs)

Structure

وحدة قاعدية احادية

► Each Ab molecule (monomer or basic unit) is Y shape

► Formed of 4 polypeptide chains

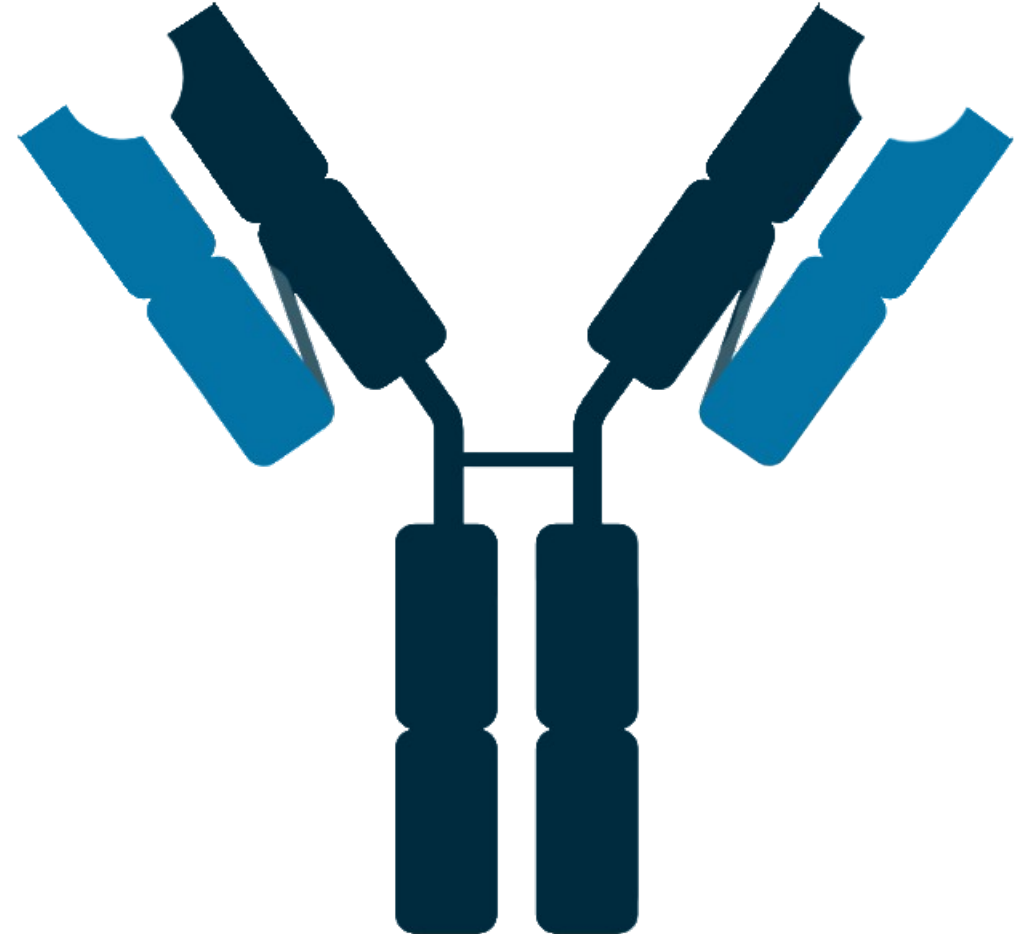
ثقيل متماثلة

2 identical heavy (H) chains,
each contains 4 domains

خفيف

2 identical light (L) chains ,
each contains 2 domains

جزء



Monomer

Immunoglobulins

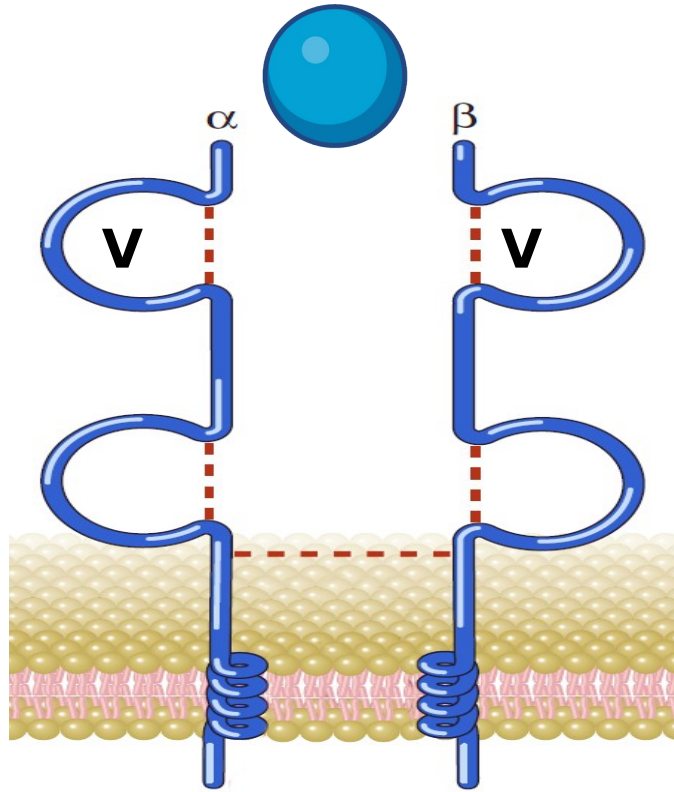
Structure

- Arranged in 3 fragments: قطع
 - 2 Identical Ag binding sites (2 Fab)
 - & 1 crystallizable (Fc)
- Each chain is formed of :
 - Variable (V) region
 - & Constant (C) region

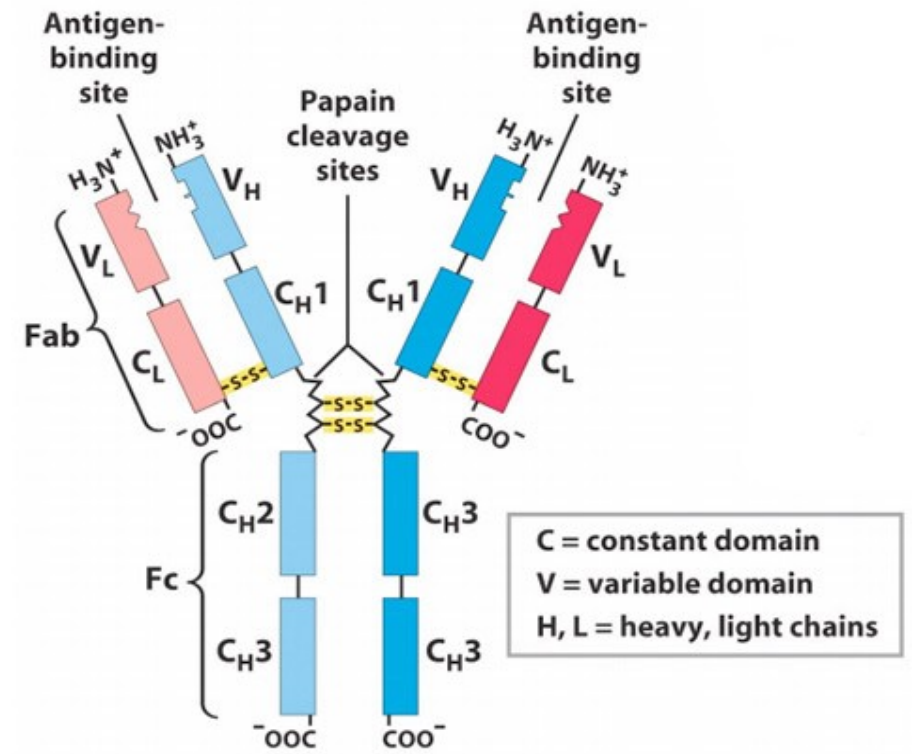


TCR

Epitope X



Clone of T cell

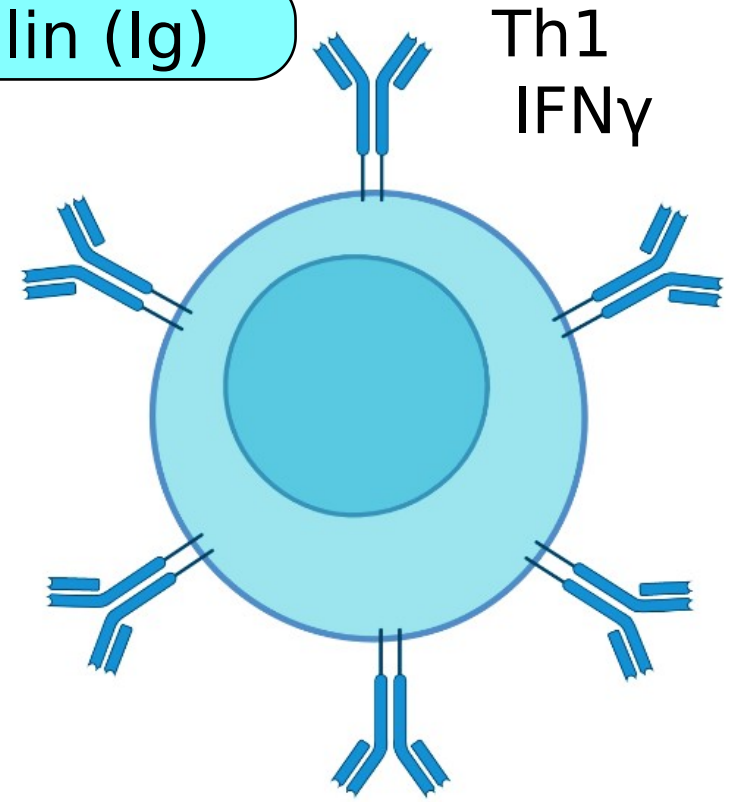
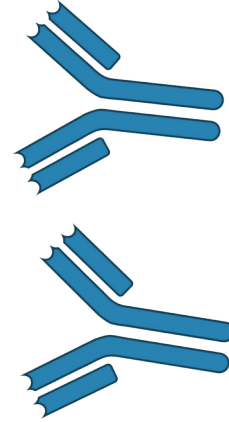
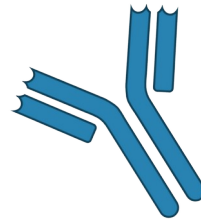
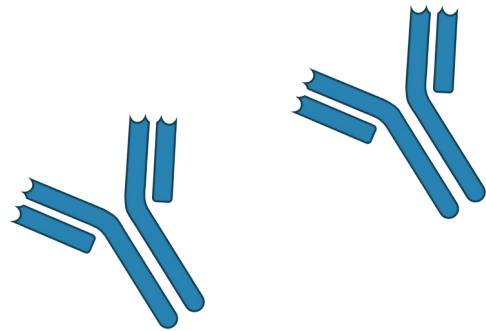


Humoral Immunity

Antibody (Ab) or Immunglobulin (Ig)

الاجسام
المضادة

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Constant region of Heavy chain

Constant region of Heavy chain

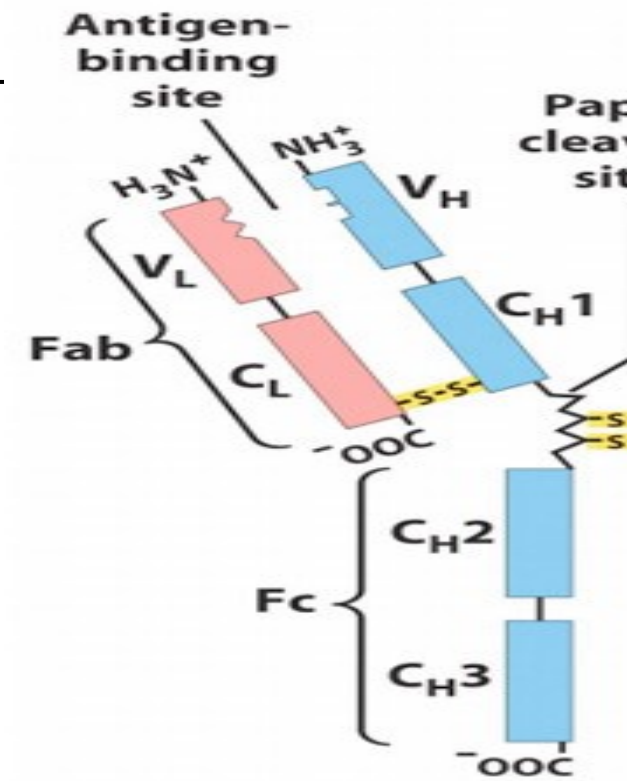
Structure

3 domains CH1, CH2, CH3

Types

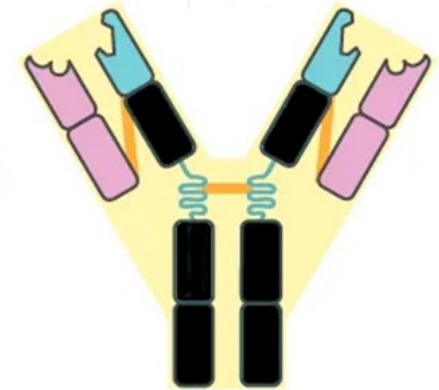
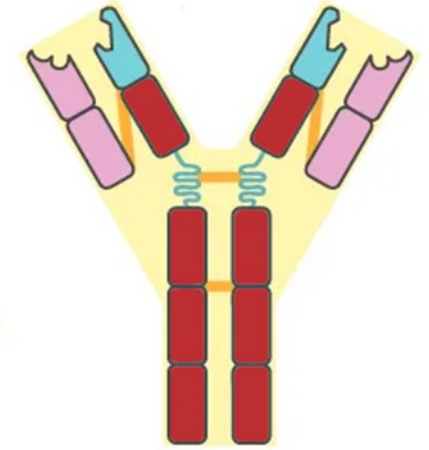
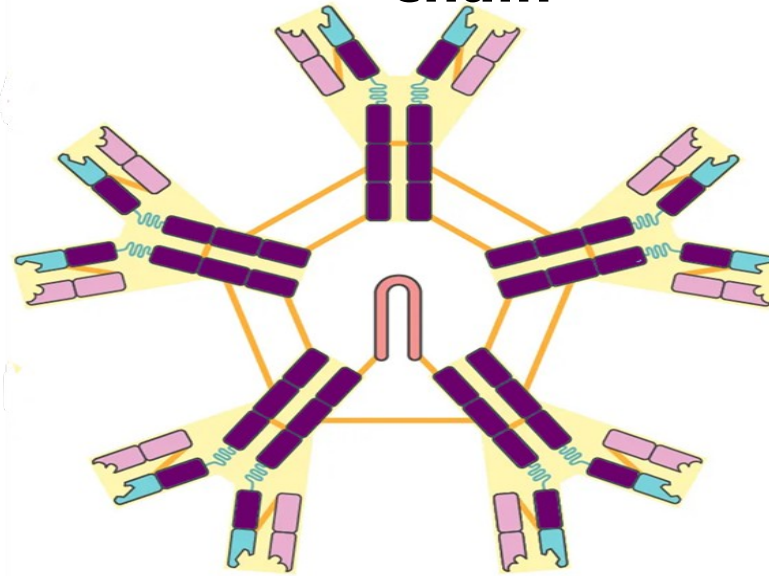
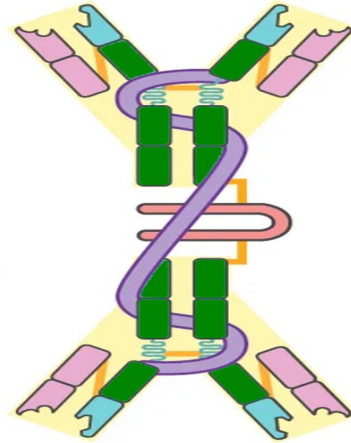
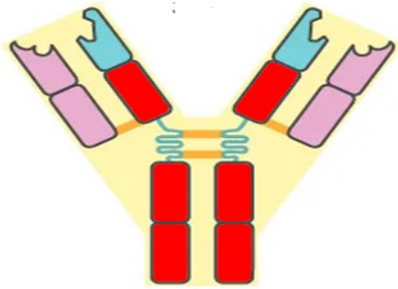
There are 5 isotypes (classes) of Igs that

differ in constant region (CH) of heavy chain



Constant region of Heavy chain

Name of constant heavy chain



There are 5 classes (isotypes) of Igs that differ in constant region (CH) of heavy chain

- 1) **Gamma** (γ) chain $\rightarrow$ Ig **G**
- 2) **Alpha** (α) chain $\rightarrow$ Ig **A**
- 3) **Mu** (μ) chain $\rightarrow$ Ig **M**
- 4) **Epsilon** (ϵ) chain $\rightarrow$ Ig **E**

The 5 classes differ in functions

Constant region of Heavy chain

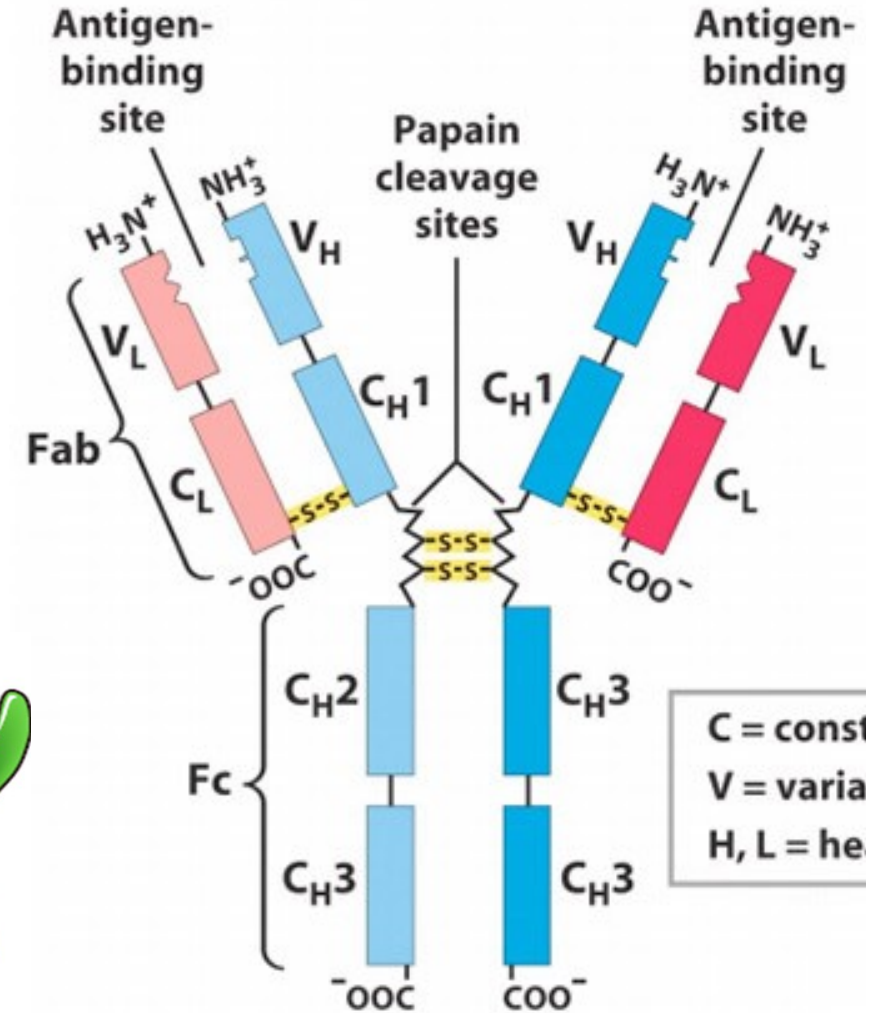
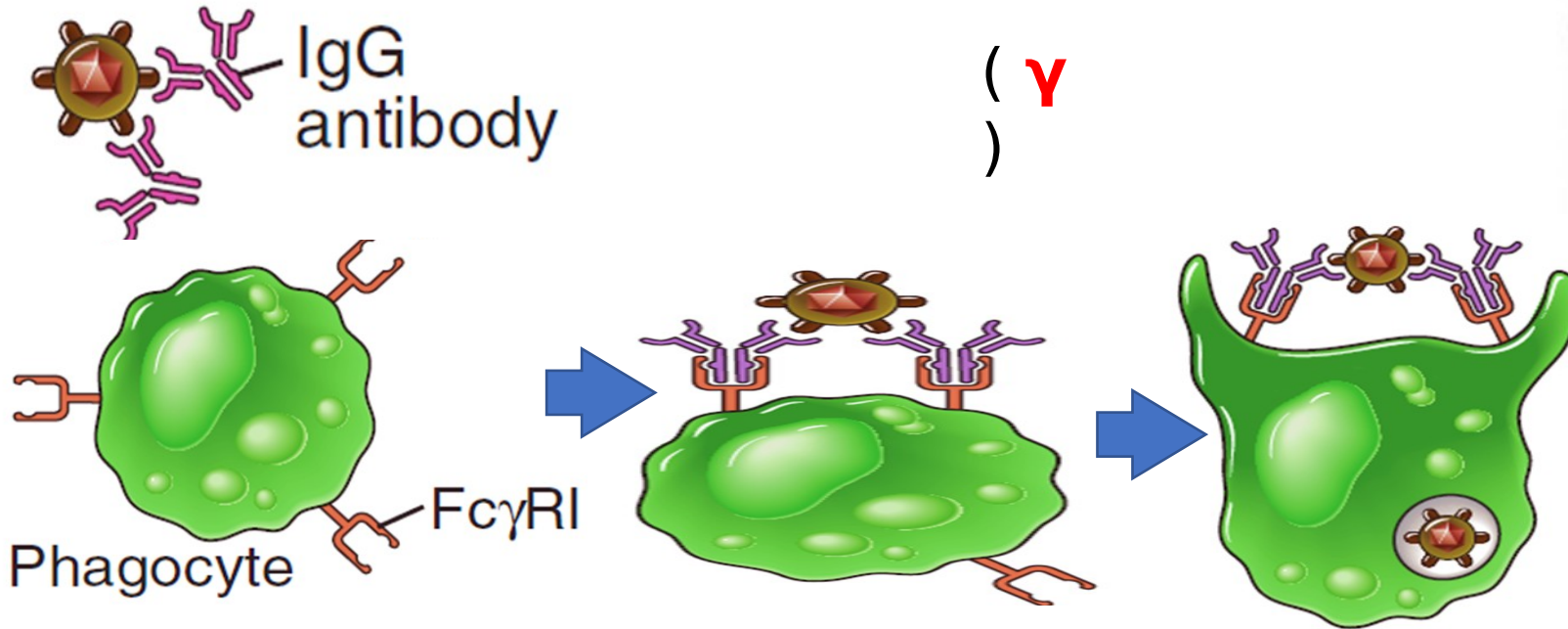
Function

الوظائف الفاعلة

Contains Fc which is responsible for biological (effector) functions of Ig e.g

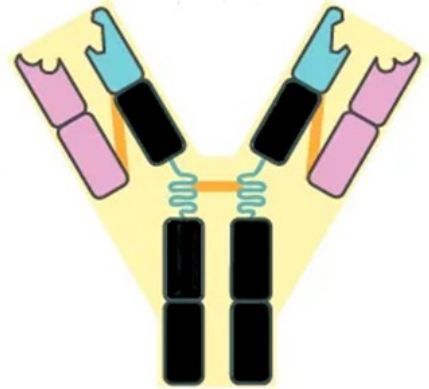
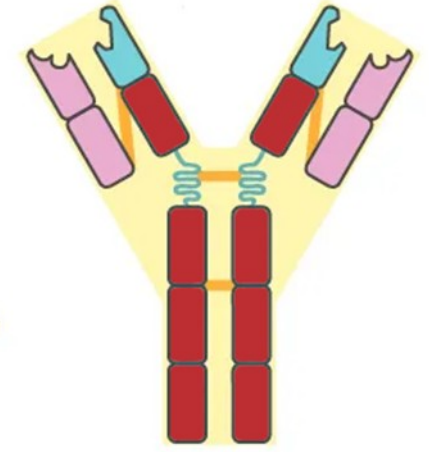
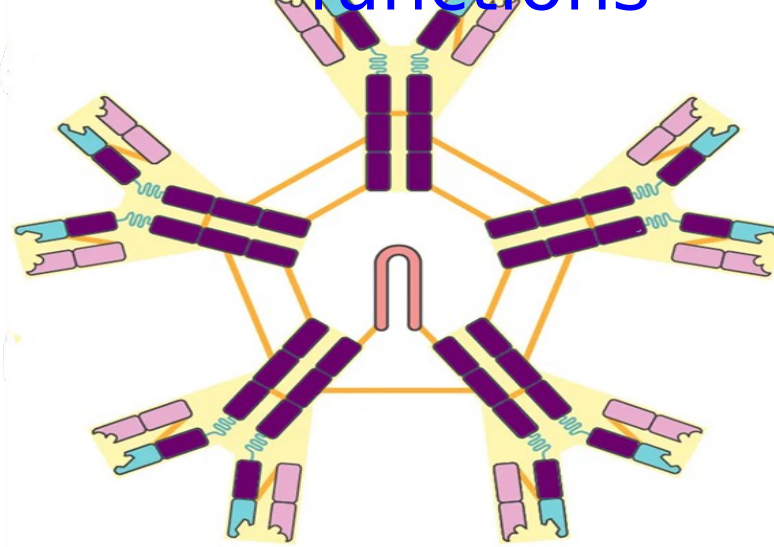
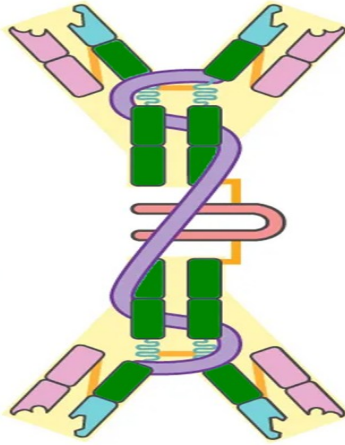
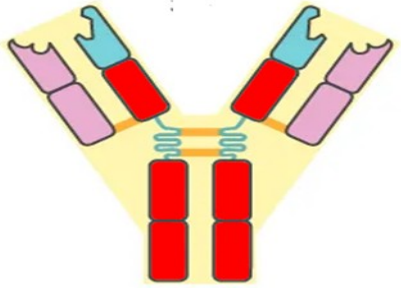
1 Binding to receptors (Fc R) on immune cells e.g Phagocytic cells → **Opsonization**

Opsonization **Opsonin**



Constant region of Heavy chain

The 5 classes differ in functions

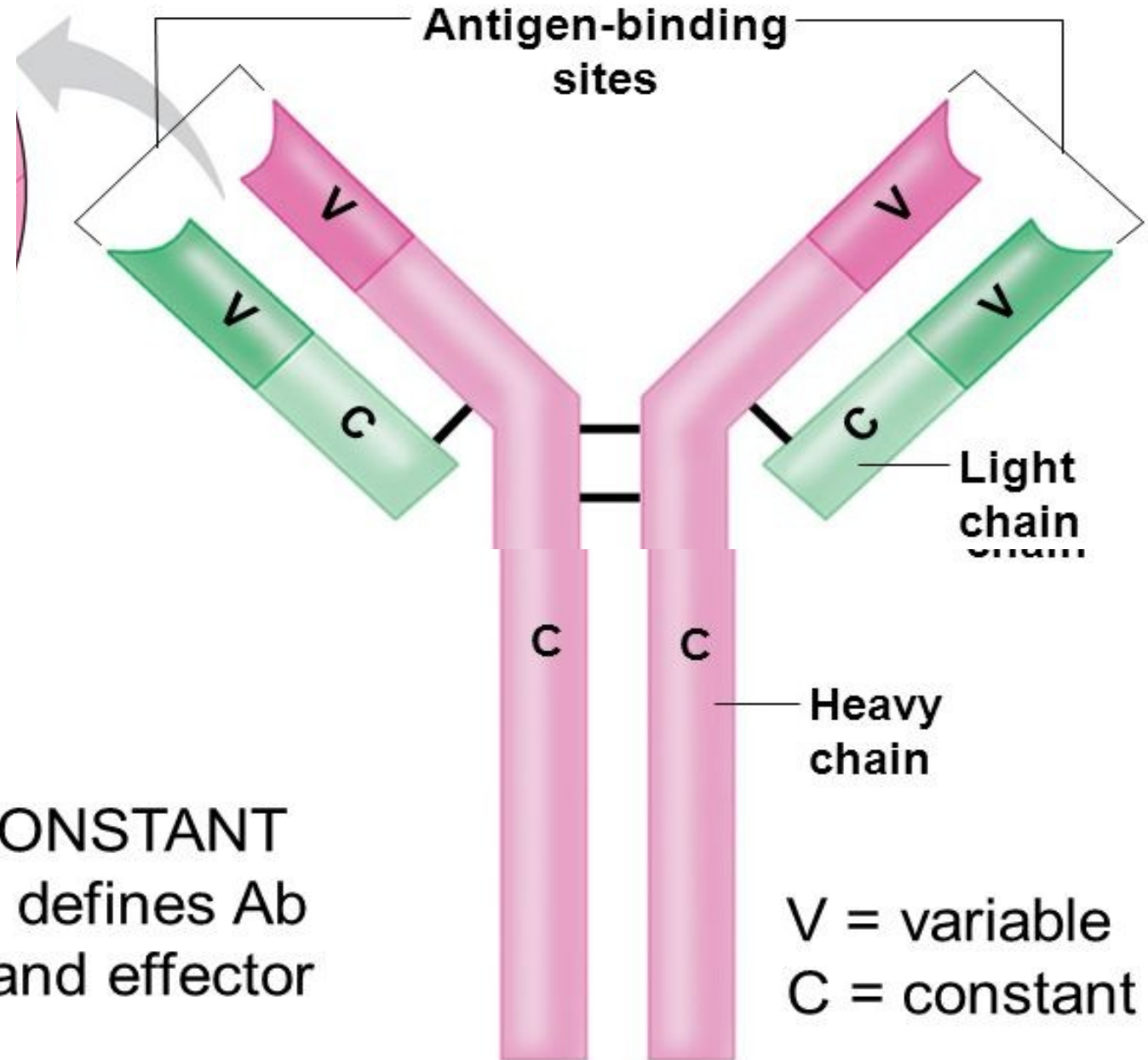


- Fc fragment differs in the 5 isotypes (classes)
 - The 5 classes have different biological functions

كل نوع لما يمسك في
نسخة من ميكروب
حي عمل وظيفة
مختلفة

The plasma cell of each B cell clone must produce
the 5 classes of Abs against its specific Ag

كل نسيطة من B
يجب ان تنتج 5 انواع
من Ab



The CONSTANT region defines Ab class and effector action

V = variable
C = constant